

# PATENT SPECIFICATION

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 (72) Inventor: DENIS ALFRED NEWELL

(19)



## (54) TOOL TIP

(71) We, ALFRED HERBERT LIMITED, a British Company of P.O. Box 30, Edgwick Works, Coventry, CV6 5GT, do hereby declare this invention for which we pray that a Patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:-

This invention relates to a tool tip for use in a machine tool, and particularly to such a tip having a plurality of cutting edges so that by indexing the tip, alternative cutting edges may be brought into operation. An object of the invention is to provide an improved tool tip of this kind.

According to the invention, a tool tip has a plurality of peripherally spaced projecting cutting edges, and a polygonally shaped recess in a major face thereof, the recess having a number of faces corresponding to the number of cutting edges, each of which faces extends in a direction generally perpendicular to the direction of projection of a respective one of the cutting edges, said faces being arranged for co-operation with clamping means for clamping the tip in operative position in a tool holder.

Preferably, the tip is generally polygonal and typically generally triangular, having a cutting edge in the vicinity of each of its apices.

One convenient form of the tool tip has a plurality of peripheral sides corresponding to the number of cutting edges, said sides being arranged for engagement with a supporting surface of a tool holder, the peripheral sides and the faces of the recess being arranged so that when a clamping force is applied to a face of the recess, a component of the force acts to resist disengagement of the corresponding external side and supporting surface.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figure 1 is a side elevation of one form of tool tip of the invention;

Figure 2 is a plan view of the tool tip of Figure 1;

Figure 3 is a cross-sectional view of the tip of Figure 1 clamped in a tool holder;

Figure 4 is a plan view of the assembly of Figure 3;

Figure 5 is a side elevation of an alternative form of tool tip of the invention, and

Figure 6 is a plan view of the tool tip of Figure 5.

Referring to Figures 1 and 2, these show a tool tip having a body 1 of generally triangular form having a cutting edge 2 adjacent to each apex of the triangle. The body has a base 3 for resting on a corresponding base of a tip-receiving recess and a number of peripheral sides 4 corresponding to the number of cutting edges, three sides 4 being provided in the case of the triangular tool tip described. A pair of the sides 4 are arranged to engage a corresponding pair of sides of the tool-holder for each clamped position of the tip, as will be described.

One main surface of the tool tip is formed with a generally triangular recess 5, the plain sides 6 of which are inclined inwardly in a direction towards the centre of the recess. Each side extends in a direction generally perpendicular to the direction of projection of a respective one of the cutting edges.

Figures 3 and 4 show the tool tip of Figures 1 and 2 clamped in a tool holder shown generally at 7. The holder has a body 8 having a tip-receiving recess 9 with a base 10 for engagement by the base 3 of the tip, and mutually inclined sides 11, 12 against which respective sides 4 of the tip engage. In the example described, the base 10 of the recess is on an inert 10a of tungsten carbide held in position by a retaining pin 10b. A clamping member 13 has a clamping surface 14 inclined in a manner corresponding to the

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inclination of the sides 6 of the recess 5 of the tool tip. The clamping member is placed in engagement with a side 6 of the tip extending between the pair of sides 4 engaged with the recess sides and a clamping force is applied, in a direction perpendicular to the base 3 of the tool tip by a screw 15 threadedly engaged with the body, or by other suitable clamping means. A component of this force urges the base 3 against the base of the recess and a further component of the force, resulting from the inclination of the recess side 6, produces force components acting to resist forces arising during cutting which would tend to pull the engaged sides 4 away from the corresponding sides of the tool holder recess. A further surface 16 on a leg 17 of the clamping member 13 is inclined in a generally opposite direction to the surface 14 for engagement with an inclined surface 18 on the body 8 and acts in a manner such as to provide additional resistance to said cutting forces.

It will be appreciated that, by virtue of the number of clamping sides 6 in the recess 5 corresponding to the number of cutting edges, the tool tip can be indexed by releasing the clamp and re-positioning the tool tip for clamping by means of an alternative side 6 of the recess.

In order to release the tip for indexing, the clamping screw 15 is released to an extent sufficient to permit the clamping member 13 to be raised clear of the top of the tip by an appropriate amount. It is desirable for the clamping member to be retained in a region generally over the tool tip when unclamped and this is achieved, in the embodiment described, by locating the leg 17 between lugs 19 on the body 8 so as to limit angular movement of the clamping means.

Figures 5 and 6 show an alternative form of tool tip which is of generally similar shape to that of Figures 1 and 2, the principal difference being that there is a recess 20 in each main surface thereof which enables the tool tip to be reversed. This version of the tool tip is clamped into a tool holder recess in similar manner to that described in connection with Figures 3 and 4 and is both indexable and reversible.

Although the embodiments of tip described are of generally triangular form, it will be appreciated that other forms of tool tip are possible embodying the principles of the invention, examples being square and hexagonal. In all cases, the recess 5 would have a number of sides corresponding to the number of cutting edges provided to enable the tool tip to be clamped in a tool holder with any one of the cutting edges in an operational position. Such alternative forms of tool tip could also be made reversible by providing a clamping recess on both sides thereof, and the invention may be applied to tool tips designed either for external or internal machining operations.

**WHAT WE CLAIM IS:**

1. A tool tip having a plurality of peripherally spaced projecting cutting edges, and a polygonally shaped recess in a major face thereof, the recess having a number of faces corresponding to the number of cutting edges, each of which faces extends in a direction generally perpendicular to the direction of projection of a respective one of the cutting edges, said faces being arranged for co-operation with clamping means for clamping the tip in operative position in a tool holder. 70
2. A tool tip according to Claim 1 which is generally polygonal and has a cutting edge in the vicinity of each of its apices. 75
3. A tool tip according to Claim 1 or Claim 2 wherein the tool tip is generally triangular. 80
4. A tool tip according to any one of the preceding Claims having a plurality of peripheral sides corresponding to the number of cutting edges, said sides being arranged for engagement singly with a supporting surface of a tool holder, the peripheral sides and the faces of the recess being arranged so that when a clamping force is applied to a face of the recess, a component of the force acts to resist disengagement of the corresponding peripheral side and supporting surface. 85
5. A tool tip according to any one of Claims 1 to 4 wherein the recess faces are inclined with respect to said major face. 90
6. A tool tip according to any one of the preceding claims wherein a recess is provided in each major surface of the tip and the cutting edges of the tip are arranged to enable the tip to be reversed. 95
7. A cutting tool tip substantially as hereinbefore described with reference to Figures 1 and 2 and Figures 5 and 6 of the accompanying drawings. 100
8. A combination of a tool tip according to any one of the preceding Claims and a tool holder, the holder having a recess with a base and a pair of mutually angled sides with which latter a pair of corresponding sides of the tip are engaged, and clamping means engaged with a face of said tip recess and arranged to urge the tip against said base and against both of said sides of the holder recess. 105
9. A combination according to Claim 8 wherein the faces of the recess are inclined with respect to said major face and the clamping member has a clamping surface inclined in a manner corresponding to the inclination of said faces and engaging one of said faces. 110
10. A combination according to Claim 8 or Claim 9 wherein the clamping means has 115
11. A combination according to Claim 8 or Claim 9 wherein the clamping means has 120
12. A combination according to Claim 8 or Claim 9 wherein the clamping means has 125
13. A combination according to Claim 8 or Claim 9 wherein the clamping means has 130

5 a further surface inclined in a generally opposite direction to said clamping surface, said further surface engaging with an inclined surface on the holder in such a manner as to provide additional resistance to cutting forces to which the tool tip is subjected in use.

10 11. A combination of a cutting tool tip and tool holder, substantially as hereinbefore described with reference to Figures 3 and 4 of the accompanying drawings.

15 MARKS & CLERK,  
Alpha Tower,  
A.T.V. Centre,  
Birmingham B1 1TT.  
Agents for the Applicants.

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2 SHEETS *This drawing is a reproduction of  
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Sheet 1*

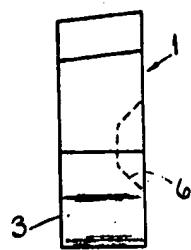


FIG.1.

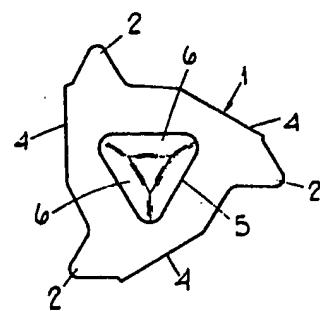


FIG.2.

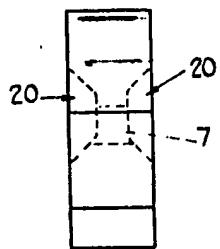


FIG.5.

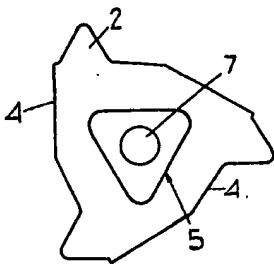


FIG.6.

FIG.3.

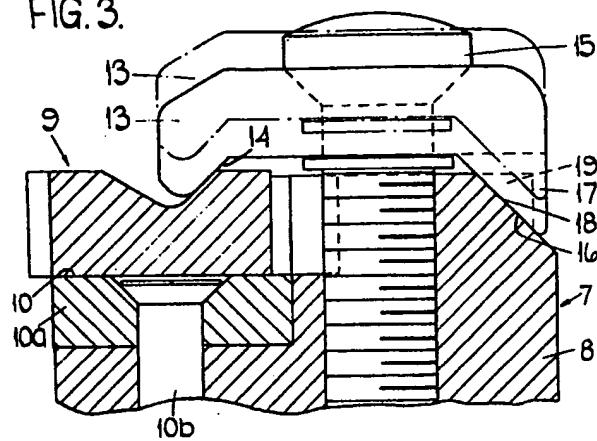


FIG.4.

